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# A Self-Reported of Malaysian Drivers on High Beam: Frequency, Motivations, and Opinions

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**ABSTRACT** – *There are various types of Malaysian drivers using the high beam in different situations, such as driving when it is raining or in foggy conditions. This study aims to explore Malaysian drivers using the high beam through a self-reported questionnaire. Also, Malaysian drivers' concerns, knowledge, and attitudes toward high beams are being investigated. This study is essential to increase Malaysian awareness about the importance of using high beams to reduce road accidents. The data was obtained from 403 respondents of Malaysian drivers of various age ranges through a questionnaire. The results found that 96.3% of the respondents are more concerned about crashing when it is dark than when it is light. Their concerns include lacking visibility due to weather or low lighting and seeing animals on the road. Besides that, most of the respondents use the high beam when driving in streets with little or no street lighting. Furthermore, most respondents stated that it is vital to use high beams, and 85.9% of them agree that automatic high beams highlight an important safety in cars. They said so because the system provides a safety feature since it would prevent glare to the other road users that could cause an accident.*

**KEYWORDS:** High beam highlights, auto high beam assist, visibility


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## 1. INTRODUCTION

According to the World Health Organization (WHO, 2022), approximately 1.3 million people die from road traffic accidents. Driving with unsafe road infrastructure, unsafe vehicles, and inadequate law enforcement of traffic laws is one factor contributing to traffic accidents. Road accidents have drastically increased in Malaysia in the last decade (Jamaludin et al., 2021). Accidents involve different aspects, such as humans, vehicles, and environments. Driving in a dark or bad weather situation also contributes to road accidents in Malaysia (Jawi et al., 2010; Kamarudin et al., 2018; Mansor et al., 2021).

The driving performance of a driver depends on the weather or condition of the surroundings. For example, drivers must slow down their vehicles and become more careful and aware of their surroundings when driving in bad weather or bad road conditions and its surroundings. In an observational study of high-beam use at 20 roadway sites in Ann Arbor, Michigan, and the surrounding country, only 18% of the more than 3,500 vehicles observed used high-beam headlights despite driving in conditions without nearby traffic or sufficient street lighting (Reagan & Cicchino, 2016). At one unlit urban location, use was less than 1%. Even on rural roads, drivers use their high beams less than half the time they should have for maximum safety (IIHS, 2016). Using the high beam when driving in dark or bad weather is crucial to preventing road accidents.

This study aims to explore Malaysian drivers using the high beam through a self-reported questionnaire. Also, Malaysian drivers' concerns, knowledge, and attitudes toward high beams are being investigated. This study is important to increase Malaysian awareness about the importance of using high beams to reduce road accidents.

## 2. METHOD

Questionnaires were distributed through various methods such as social media platforms, students, and staff from Universiti Teknikal Malaysia Melaka (UTeM), friends, families, and others to achieve a large sampling for this study. As many as 403 respondents answered the questionnaire and they were compensated with tokens worth MYR 5 for cooperation.

The questionnaire that the respondents answered to achieve the objectives of this study was implemented from the work of Reagan and Cicchino (2016) and adapted according to the suitability of Malaysian road conditions. The questionnaire was divided into six parts, including the sample's demographic data, driving exposure, concerns about seeing and crashing at night, and self-reported frequency of high beam use in various roadway environments. The questionnaire continued with the high beam use in various conditions, the importance of why other drivers underuse high beams, and knowledge of and attitudes towards high beam assist (also called automatic high beam headlights) (Prasetijo et al., 2020).

The method used to analyze the data obtained is descriptive statistics.

## 3. RESULTS AND DISCUSSION

### 3.1 Driving Exposure of the Sample

Table 1 shows the demographic data and driving exposure of the sample collected from 403 respondents. Overall, the data collected data between 18-60 years old, and most respondents were aged between 18 and 30. Almost half of the respondents drive at least once a week on a dark road (43.7%) and drive with more than 50% when it is dark (44.5%). Nearly 40% of the respondents drive on city streets daily or most days, once or more a week on suburban roads, and a couple of times or less a month on country roads. It showed that the respondents are often exposed to the city streets, followed by suburban and country roads.

**TABLE 1:** Demographic data and driving exposure of the sample

| Characteristics | Percent (N = 403) |
|---|---|
| Age | |
| 18-30 | 89.3 |
| 31-40 | 6.7 |
| 41-50 | 3.5 |
| 51-60 | 0.5 |
| >60 | 0.0 |
| Sex | |
| Male | 72.7 |
| Female | 27.3 |
| Kilometers (km) driven per year | |
| < 5,000 | 22.6 |
| 5,000 – 10,000 | 21.8 |
| 10,000 – 15,000 | 16.6 |
| > 20,000 | 21.3 |
| Unsure | 17.6 |

| | |
|---|---|
| In the past month, how often did you drive when it is dark? | |
| A few times per month, but not weekly | 25.3 |
| At least one a week, but not daily | 43.7 |
| Everyday | 25.3 |
| Unsure | 5.7 |
| How much of your driving occurs when it is dark? | |
| Less than 25% | 15.4 |
| About 25% | 29.5 |
| About 50% | 33.3 |
| About 75% or more | 11.2 |
| Unsure | 10.7 |
| How often do you drive on city streets? | |
| A couple of times per month or less | 22.8 |
| Once or more a week | 33.7 |
| Every day or most days | 40.0 |
| Unsure | 3.5 |
| How often do you drive on suburban roads? | |
| Couple of times per month or less | 22.6 |
| Once or more a week | 39.5 |
| Every day or most days | 27.0 |
| Unsure | 10.9 |
| How often do you drive on country roads? | |
| Couple of times per month or less | 39.0 |
| Once or more a week | 28.3 |
| Every day or most days | 19.9 |
| Unsure | 12.9 |

### 3.2 Concerns about Seeing and Crashing at Night

The respondents' concerns about seeing and crashing at night were tabulated as shown in Table 2. As much as 96.3% of the respondents are concerned about crashing when it is dark than when it is light. Out of 388 respondents concerned about crashing when it is dark, the respondents with the highest percentage lack visibility due to weather or low lighting (85.6%). Different weather surroundings, such as rainfall (Amin et al., 2014) and fog (Yadav et al., 2014), affect the visibility of the drivers that could lead to and eventually increase the risk of accidents occurring (Bergel-Hayat et al., 2013). The visibility of drivers worsens when driving at night, especially when the surrounding road is dark. These conditions affect most drivers to change their driving behavior, such as slowing down the speed and driving more carefully. The reasons followed by seeing animals either on the road or side of the road, such as dogs, cats, and cows (68.0%), not seeing dangers, other accidents, and pedestrians (58.8%), and other reckless or drunk drivers (47.4%).

Out of 403 respondents, 72.2% stated that they have vision problems that make driving in the dark more difficult than when it is light, and almost half of the respondents reduce their driving in the dark for those with vision problems. But, among them (19.4%), sometimes they do not reduce their speed when driving in the dark. They may not reduce speed because they depend on the light reflector when driving in the dark. The roadside reflector posts (Kallberg et al., 1993), road lighting (Assum et al., 1999), and edge lines (Steyvers & De Waard, 2000) are examples of the assistance that the drivers depend on. Even drivers that do not have vision problems also depend on the reflectors when driving in the dark.

In a fog or rain situation, 26.3% of the respondents are not reducing their amount of driving in dark and unlit conditions out of concerns about visibility issues associated with rain or fog. A result was found by Mueller and Trick (2012) that experienced drivers drive at higher speeds rather than novice drivers in low visibility, such as fog and rain conditions. They handle and control the steering wheel and pedals more efficiently to estimate a proper steering angle when cornering and pedals when accelerating and braking. Also, over 90% of the respondents would drive differently when it is dark than when it is light. The respondents stated that they would drive cautiously or carefully (86.8%), be more aware and observant of animals and accidents (71.0%), drive slower (62.8%), use high beams (46.2%), and drive more defensively (42.9%).

**TABLE 2:** Concerns about seeing and crashing at night

| | **Percent** |
|---|---|
| More concerns about crashing when it is dark than when it is light | N = 403 |
| Yes | 96.3 |
| No | 3.7 |
| Among these more concerned about crashing when it is dark, what are your concerns? | N = 388* |
| Seeing animals (e.g., dog, cat, wild boar, cow, deer, etc.) | 68.0 |
| Lack of visibility due to weather or low lighting | 85.6 |
| Difficulty seeing because of age or vision issues | 33.3 |
| Not seeing dangers, other accidents, pedestrians | 58.8 |
| Other reckless or drunk drivers | 47.4 |
| Getting help when getting into an accident | 26.8 |
| Other: | |
| Robbery | 0.4 |
| White beams | 0.4 |
| Sleepy driver | 0.2 |
| Ghost | 0.2 |
| Less number of streetlights | 0.2 |
| Road conditions | 0.4 |
| Have vision problems that make driving in the dark more difficult than when it is light | N = 403 |
| Yes | 72.2 |
| No | 27.8 |
| Among those with vision problems, ever reduce driving in dark | N = 290 |
| Yes | 42.9 |
| No | 19.4 |
| Not applicable to me | 37.7 |
| Ever reduce the amount of driving in dark and unlit conditions out of concerns about visibility issues associated with fog or rain | N = 403 |
| Yes | 73.7 |
| No | 26.3 |
| Drive differently when it is dark compared with when it is light | N = 403 |
| Yes | 90.8 |
| No | 9.2 |
| Among those who drive differently in dark, how: | N = 365* |
| Drive slower | 62.8 |
| Drive cautiously or carefully | 86.8 |
| More aware or observant for animals and accidents | 71.0 |
| Use high beams | 46.2 |
| Drive more defensively | 42.9 |
| Other | 1.7 |
| Unsure | 1.2 |

**Multiple responses allowed; percentages sum to more than 100 percent*

### 3.3 Frequency of High Beam Use in Various Roadway Environments

The questionnaire continued with a self-reported frequency of high beam use in various roadway environments, and the data obtained are tabulated in Table 3. When driving, the respondents stated that they are always (2%), most of the time (5%), sometimes (20%), rarely (35%), never (35%), and unsure/do not drive (2%) when using high beam in city streets with good street lighting. Even though the city streets provide good street lighting, some drivers still use high beams (always, most of the time, and sometimes). The possibility of using a high beam is to see the small animals, such as cats or small dogs, that are on the road (see Table 2).

**TABLE 3:** Self-reported frequency of high beam use in various roadway environments (Percent, N = 403)

| Environment | Always | Most of the time | Sometimes | Rarely | Never | Unsure/don't drive on these roads | Total |
|---|---|---|---|---|---|---|---|
| High beam use in city streets with good street lighting | 2 | 5 | 20 | 35 | 35 | 2 | 100 |
| High beam use in city streets with little or no street lighting | 8 | 23 | 42 | 21 | 5 | 1 | 100 |
| High beam use in winding rural country roads with little or no street lighting and speed limits over 60 km/h | 16 | 38 | 35 | 7 | 1 | 3 | 100 |
| High beam use in straight rural country roads with little or no street lighting and speed limits over 60 km/h | 21 | 36 | 30 | 9 | 2 | 1 | 100 |

Besides, only 8% of the respondents always use/most of the time (23%)/sometimes (42%) use high beams when driving in city streets with little or no street lighting. The remaining percentage of the respondents expressed that they rarely (21%), never (5%), and unsure/do not drive (1%) using a high beam when driving in this environment. Since the city streets have good surroundings, such as good light reflectors, visible road markings, and good road signs, expert drivers hugely depend on the signs to not use high beams. However, for careful drivers, the possibility of them using high beams when driving in city streets with little or no street lighting is high.

Sixteen percent of the respondents always use high beams in winding rural country roads with little or no street lighting when driving over 60 km/h. The remaining respondents indicated that they are most of the time (38%), sometimes (35%), rarely (7%), never (1%), and unsure/do not drive (3%) when they are driving in this environment. The last question asked from this part was the frequency of using high in straight rural country roads with little or no street lighting and speed limits over 60 km/h. The data collected showed that respondents are always (21%), most of the time (36%), sometimes (30%), rarely (9%), never (2%), and unsure/do not drive (1%) in using high beams. From the results, the frequency of Malaysian drivers using high beams when driving on country roads with little or no street lighting is higher than in city streets with little or no street lighting. Based on Samsuddin and Mohd Masirin (2016), who studied the road infrastructure of a country road in Malaysia, found that the country road is poor road infrastructure such as poor roadside protection, poor road design, poor access management, work/construction zone safety, poor pavement management, and poor traffic management. Furthermore, the road infrastructures, such as road markings and signs in country streets, are poorer than city streets.

### 3.4 High Beam Use in Various Conditions

The questionnaire continued with questions about using high beams in various situations, such as driving in the rain, in fog, and with many animals crossing the roads. The questionnaire is self-rated with a three-point Likert scale (more often, same amount, and less often). The data obtained from the respondents (N = 403) is shown in Table 4.

**TABLE 4:** High beam use in various conditions (percent)

| Conditions | All drivers (N = 403) |
|---|---|
| High beam use when it rains compared with when it is not raining | |
| More often | 33.5 |
| Same amount | 33.3 |
| Less often | 33.3 |
| High beam use when it is foggy compared with when it is not foggy | |
| More often | 48.1 |
| Same amount | 29.5 |
| Less often | 22.3 |
| High beam use in certain areas where I know there are a lot of animals crossing the roads (e.g., monkey, dog, wild boar, chicken, etc.) | |
| More often | 56.3 |
| Same amount | 30.5 |
| Less often | 13.2 |

When driving in a rainy environment, the respondents stated that they use using high beam more often (33.5%), the same amount (33.3%), and less often (33.3%) compared with when it is not raining. Furthermore, the respondents expressed that they use high beam more often when it is foggy (48.1%) than when it is not. When the surrounding is foggy, 29.5% of respondents use high beams the same amount as when it is not foggy, and 22.3% use them less often. The results found that the respondents use a high beam more often when it is foggy compared with when it is not foggy rather than when it rains compared with when it is not raining. This is because of the different visibility seen by the drivers when it is raining and foggy due to the different sizes of droplets in fog being smaller with rain (Green et al., 2021). In dense fog conditions, the drivers hardly see the objects and road ahead, making them use high beams more often.

While driving in certain areas where a lot of animals are crossing the roads, 30.5% of respondents expressed that they are using the same amount of high beam compared to when no animals are crossing the roads, and another 13.2% would use less often. In Malaysia, many animals are crossing the roads (Jantan et al., 2020; Said et al., 2021), and the recorded data stated the highest percentage in Table 4 (respondents use high beams more often than usual). For example, in residential areas, many small animals such as cats, dogs, and rats make drivers more often in using high beams. While on rural roads interconnected between towns, many farm animals such as cows, goats, buffaloes, and chickens are often sighted on the road.

### 3.5 Importance of Reasons Other Drivers Underuse High Beam

The importance of why other drivers underuse high beams is being asked in the questionnaire, and the respondents would rate the questionnaire according to their opinions. The questionnaires are a six-point Likert scale (extremely important to unsure) and are tabulated in Table 5.

The respondents expressed that it is an extremely important and very important factor the beliefs that some drivers are not aware they have different high beam settings (55.6%), they see clearly with their low beams (46.9%), they get tired of switching between high and low beams (42.5% & 56.1%), and they forget to activate high beams (48.9%). Out of five reasons in the questionnaire, the highest percentage recorded is that many drivers get tired of switching between high and low beams when they see cars driving toward them. Even though high beams increase the amount of light needed to see objects in darkness, they are unsafe to use when other vehicles are present on the road and are, therefore, mainly appropriate for use when driving alone on the road or in rural areas and open highways away from urban roads (Sullivan et al., 2004). Light from the high beams causes a glare if directed at the eyes. If the light is directed to the eyes of the driver, the possibility of an accident is high since the driver cannot see properly what is ahead of them during driving.

**TABLE 5:** Importance of reasons why other drivers underuse high beams (percent)

| Reasons | All drivers (N = 403) |
|---|---|
| Some drivers are not aware they have different high beam settings | |
| Extremely important | 23.6 |
| Very important | 35.0 |
| Important | 28.8 |
| Of minor importance | 7.2 |
| Not important at all | 1.5 |
| Unsure | 4.0 |
| Many drivers believe they see fine with their low beams and do not need high beams | |
| Extremely important | 16.1 |
| Very important | 30.8 |
| Important | 36.0 |
| Of minor importance | 11.9 |
| Not important at all | 1.2 |
| Unsure | 4.0 |
| Many drivers get tired of switching between high and low beams when they drive on roads where streetlights come and go every couple of kilometers | |
| Extremely important | 15.9 |
| Very important | 26.6 |
| Important | 31.0 |
| Of minor importance | 17.4 |
| Not important at all | 4.2 |
| Unsure | 5.0 |
| Many drivers get tired of switching between high and low beams when they see that cars are driving toward them | |
| Extremely important | 29.3 |
| Very important | 26.8 |
| Important | 27.3 |
| Of minor importance | 11.2 |
| Not important at all | 2.5 |
| Unsure | 3.0 |
| Many drivers forget to activate high beams for long periods | |
| Extremely important | 15.6 |
| Very important | 33.3 |
| Important | 30.3 |
| Of minor importance | 12.2 |
| Not important at all | 3.5 |
| Unsure | 5.2 |

### 3.6 Knowledge of and Attitudes towards High Beam Assist

The last section of the questionnaire concerns the knowledge of and attitudes towards high beam assist, also known as automatic high beam headlights of Malaysian drivers. The responses are summarized in Table 6. Out of 403 respondents, almost half of them (41.4%) have not heard about the automated high beam headlights, and one fifth among drivers who have heard of them are unsure about the function of automated high beam highlights. The possibility for those who have not heard about the automated high beam headlights is the lack of exposure to this new system the Malaysians. However, in these recent years, the Malaysian government have implemented this new system (automated high beam) in the latest cars (local cars) such as Proton X70, Perodua Ativa, and Perodua Myvi. Due to this exposure, Malaysians are indirectly exposed to the automated high beam.

Over 98% of the respondents agreed that automatic high-beam headlights sound like an important safety feature in cars. They would like to own a vehicle with automatic high-beam headlights. Among the drivers who would not want a car with auto-switching high beams (<2%), they expressed that because of malfunction of the system or blind people with high beams. Other reasons are they prefer to control their car and added cost to the car. Almost most respondents agree that automatic high-beam headlights are a safety feature in cars, and they would like to own a car with automated high-beam highlights. Since the automated high beam is automatically turned on and off, the system eliminates the work and stress as the normal high beam is manually turned on and off (Nowak, 2018). Furthermore,

as the automated high beam automatically functions, the incoming vehicle (driver) does not experience uncomfortable glare since the glare from the high beam could lead to an accident (Shinajr, 1984).

**TABLE 6:** Knowledge of and attitudes towards high beam assist (also called automatic high beam headlights)

| Knowledge | Percent |
|---|---|
| Have you heard of automatic high-beam headlights | N = 403 |
| Yes | 58.6 |
| No | 41.4 |
| Among drivers who have heard of them, a description of what automatic high-beam headlights do | N = 236* |
| Automatically turn on or off when senses the absence or presence of other cars | 59.6 |
| Automatically turn on or off when dark or light | 47.9 |
| Automatically turn on or off | 17.1 |
| Automatically turn it on or off when needed | 27.3 |
| Other | 0.5 |
| Unsure | 21.1 |
| After being told the correct definition, agree or disagree that automatic high-beam headlights sound like an important safety feature in cars | N = 403 |
| Strongly agree | 56.1 |
| Moderately agree | 29.8 |
| Neutral | 12.9 |
| Moderately disagree | 1.2 |
| Strongly disagree | 0.0 |
| After being told the correct definition, agree or disagree that they would like to own a vehicle with automatic high-beam headlights | N = 403 |
| Strongly agree | 50.4 |
| Moderately agree | 29.5 |
| Neutral | 18.6 |
| Moderately disagree | 1.5 |
| Strongly disagree | 0.0 |

**Multiple responses allowed; percentages sum to more than 100 percent*

The questionnaire ended with the importance when using a high beam on different factors (see Table 7). Almost all the respondents expressed positive responses when deciding to use high beams. Forty-four percent of the respondents stated that using high beams to get extra viewing distance is extremely important. In using the high beam, the respondents stated that it is extremely important to avoid causing glare for drivers directly in front of themselves (47%) and avoid causing glare for drivers driving toward themselves from the opposite direction (50%).

**TABLE 7:** Importance of using high beam on different factors

| | Extremely important | Very important | Important | Of minor important | Not important at all | Unsure |
|---|---|---|---|---|---|---|
| The extra viewing distance I get from high beams compared with low beams | 44 | 32 | 23 | 1 | 0 | 0 |
| Avoiding causing glare for drivers directly in front of me. | 47 | 25 | 25 | 1 | 0 | 1 |
| Avoiding causing glare for drivers driving toward me from the opposite direction | 50 | 27 | 20 | 1 | 0 | 0 |

## 4. CONCLUSION

In conclusion, some respondents (drivers) do not use the high beam headlights as often as they should when driving with low visibility (rain or fog) on a dark street, even though they have vision problems. However, they agreed and positively responded to the automated high beam headlights system to be implemented in their vehicle in the future. They said so because the system provides a safety feature since it would prevent glare to the other road users that could cause an accident.

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